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AUTHOR Hartman-Haas, Hope J.
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ABSTRACT

In the perspective on cognitive development provided by Jean Piaget, the elaboration of cognitive skills is possible and acceptable, although it is objectionable and perhaps impossible to attempt to accelerate those skills. The explicit teaching of reasoning skills is necessary since not every student attains the formal operational level without special intervention. Courses in cognitive processes development focus on enhancing such skills as problem solving, decision making, logical thinking, critical thinking, and analytical reasoning. Programs range from the philosophy for children units for grades five to twelve to college courses in critical listening, logic, and reasoning. Experimental results indicate that such programs have a positive effect on reasoning ability. Resistance to cognitive skill instruction among students stems from the perceived lack of official curricular status of listening and thinking skills throughout the educational process. (DF)

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Improving Cognitive Skills: Procedures, Problems and Prospects

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Hope J. Hartman-Haas*

Rockland Community College

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Can Cognitive Skills Be Taught?

Jean Piaget is undoubtedly the most influential thinker in the area of developmental psychology today. His theory of intellectual development has impacted psychological theory, research and educational practice in a myriad of far reaching ways around the world. Piaget's distaste for the American preoccupation with designing studies to accelerate intellectual growth is well known. Frequently his uneasiness over this practice is interpreted as implying that intelligence is not amenable to training. However, Piaget does not deny the possibility of training cognitive skills, nor does he object to the concept. Piaget accepts the possibility of facilitating the development of intelligence provided that the cognitive structures are there to be developed; i.e. acceleration is subordinate to maturation. (Haas 1976a) In his treatise on education, Piaget (1971) notes that accelerated operations are not derived from education but are facilitated by it. Just as maturation alone is not an adequate concept for explaining development, neither is pure experience; the two factors must interact. Perhaps the issue can be clarified further by noting that many studies labeled as acceleration would more appropriately be described as elaboration (Elkind 1972). Elaboration implies the existence of a structure which can be built upon while acceleration implies training without consideration of the existence of structure. Thus Piaget would find elaboration of cognitive skills to be acceptable and possible, but acceleration to be objectionable and perhaps impossible.

* presented at The Third Annual Symposium on Developmental/Remedial Education April 20-22, 1980, Rochester, New York.

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Burton et.al. (1960) pose the question, "can thinking be taught?" Essentially, they argue that while no one can teach another person "how to think", one can teach people how to think more effectively. One can teach people to improve the thinking skills they already have, to identify valid thought patterns and to detect errors in reasoning.

There are two classical studies which demonstrate that reasoning can be taught. Glaser (1941) compared the critical thinking skills of students who participated in an experimental thinking program with matched control subjects. The results showed that the experimental group made significant gain over the controls, thus indicating that critical thinking skills can be taught. Morgan and Morgan (1953) addressed the issue of whether untrained subjects can be expected to think logically. They compared the logical reasoning ability of subjects who had been trained in logic with those who had not. Most of the trained subjects scored higher than the untrained subjects, thereby suggesting that while training logical thinking might not be necessary in some cases, it is clearly possible and usually beneficial.

Should Cognitive Skills Be Taught?

Having established that it is possible to train the thought processes, the question becomes one of determining whether such instruction is desirable. Addressing this issue, Burton et.al. (1960) argue that not only is the improvement of thinking worthwhile, but that there may be dire consequences of not improving thinking. "...incomparable improvements in the worth and security of life have resulted from competent thinking. This is true for the individual, the community group, and the nation. There is hope that sound thinking may be applied to international affairs. Incorrect and/or dishonest thinking has precipitated disaster many times in our economic, social, political and military history. Considerable disaster could still result if we do not 'take thought'.

Every area of human endeavor from rearing children to the management of international relations is affected".

Miles (1978) argues for teaching reasoning in college because "...most instruction in any discipline relies on the quality of the students' ability to reason. Students who are weaker than need be in their reasoning abilities are crippled when trying to learn and practice anything else". Miles believes that it is the responsibility of educational institutions to develop students' reasoning abilities, because reasoning makes such major contributions to successful living. He claims that explicit instruction in reasoning is called for because "...merely teaching the facts, theories or practice of a discipline does not necessarily help students improve their reasoning abilities".

While Piaget opposes attempts to induce intellectual development for its own sake, getting to a particular stage faster by pushing the child before s/he is ready (Siegel 1969), improving the cognitive skills of college students clearly does not fall into this category. In the case of college students the focus is on developing skills that the students already possess to some extent; it is not a matter of pushing the students to think on a level beyond their range. Programs designed to improve intellectual operations can be valuable for two major reasons. They can maximize the student's performance at a given stage of development, and they can facilitate the transition between one stage and the next. Until relatively recently Piaget might have said that it is unnecessary to provide programs to train intelligence because these cognitive skills will occur spontaneously during the course of development. In a major revision of his theory, Piaget (1972) acknowledged that the development of formal operations is not inevitable. While some people clearly do develop their intelligence to the highest level without any special intervention, many may never become formal operational without it (Haas 1976a).

How Have Cognitive Skills Been Taught?

During the past eight years there has been a Zeitgeist for and a grass roots movement of improving thinking in our educational institutions. Programs have sprung up independently from elementary schools through colleges across the country. Some of these are process-based courses in which cognitive skills are taught but traditional curricular content is not, while others integrate instruction in thinking into content area courses. While a number of integrated process-content courses focus on one particular discipline, such as mathematics, physics, sociology or economics, a number of programs are multidisciplinary in their orientation. There are two distinct variations of the multidisciplinary approach. Several disciplines may be treated within the framework of a single thinking course, or alternatively, thinking may be focused on across content area courses. The latter may be referred to as "Thinking Across the Curriculum".

An informal survey of courses which specialize in cognitive process instruction shows that most frequently, courses focus on developing skills such as problem solving, decision making, logical thinking, critical thinking and analytical reasoning (see Table 1). A few courses approach teaching for cognitive development from systematically derived knowledge and implications of Piaget's theory.

A majority of the programs developed are relatively small in scope and scale; however, three programs stand out in their comprehensiveness and/or degree of application. ADAPT, which was developed at the University of Nebraska (1976) is a Piagetian based multidisciplinary program for college freshmen. Students in the ADAPT program spend 20 hours a week in specially designed courses in English, Economics, Anthropology, History, Math and Physics. ADAPT classes are characterized as "activity centered learning" and are based on a learning cycle model, which begins with concrete exploratory experiences. Experiences, rather than

textbooks, form the basis of the curriculum. From these experiences students learn to define words and invent concepts which are then applied to various other experiences. Thus the learning cycle model, which is the foundation of instructional activities across the disciplines, consists of three stages: exploration, invention and application. Content and process are given equal emphasis in the ADAPT program, and " ...content is coordinated so as to reinforce the important reasoning skills used in each discipline" (ADAPT 1976). Through a self-regulating learning process ADAPT is intended to promote analytical, logical and critical thinking and to facilitate the transition between concrete and formal operations.

Like ADAPT, the Ontario Institute for Studies in Education (OISE) Inquiry Training program (Robinson, Tickle and Brison 1972) has its theoretical underpinnings in Piagetian theory, it integrates process and content, and it utilizes an interdisciplinary approach. Unlike ADAPT, the Inquiry Training project is directed towards the pre-college age population, starting with kindergarten. It focuses on developing six different areas of problem solving: logical inquiry, physical science experiments, experiments involving randomization, correlational analysis, case studies and real life problems. Inquiry Training begins with learning a general problem solving model which is later modified according to the needs of particular disciplines. The specific cognitive skills to be developed through Inquiry Training include questioning, generating ideas, planning, measuring and estimating, drawing conclusions and generalizing. Robinson et.al. (1972) explain that they "drafted a rough chronology" of the course of development of these processes over the school years and devised their materials to promote growth along this dimension, thereby utilizing a cognitive-developmental approach.

Another program designed to improve the reasoning of pre-college age students, Philosophy for Children (P4C) was developed at Montclair State College. The

content of philosophy as well as philosophical thinking are emphasized in this program. P4C began as a program for fifth and sixth graders, but it ultimately led to the development of a sequence of programs through high school. Matthew Lipman, originator of the program, now publishes a journal entitled Thinking which provides a vehicle for communication between those interested in the program. Lipman and Sharp (1975) conceptualize the program as providing an environment conducive to thinking as opposed to teaching students to think. They assume that some environments are more conducive to thinking than others and that teachers can create an environment in which students can, "....develop the courage to discuss, to reason, to reflect, to express (themselves), to compare and contrast (their) views with others... in short, to try out (their) intellectual wings". P4C is a discussion-centered program in which children's philosophical novels serve as the springboard for discussion. The teacher's role is to serve "as a facilitator of intellectual exploration - not as an authority figure with the right answers" (Lipman and Sharp 1975). P4C course objectives include the improvement of reasoning abilities (perceptual inferences, logical inferences and inferences from evidence), the development of creativity, personal development and a "set of discoveries" including alternatives, impartiality, consistency, comprehensiveness, and rationale for beliefs.

How Effective Has Been Cognitive Skill Instruction?

A relatively scant amount of attention has been devoted to the evaluation of programs for improving thinking. The paucity of evaluation studies is probably best understood as reflecting the groundbreaking nature of such programs rather than as implying a lack of commitment to evaluation. Most reports on these experimental thinking programs indicate that the investigators plan to evaluate, but that at the time the reports are written such evaluation would be premature. Another factor which may impede or at least defer evaluation of such programs is the lack of appropriate instruments to measure the cognitive skills being developed.

Using paper and pencil Piagetian formal operations tasks specially designed for this program, ADAPT investigators found that their experimental subjects scored significantly higher than controls on three of the eight subtests and on the composite index. They concluded that "...ADAPT students are learning how to think abstractly and to perform formal operations at a pace that is not matched by the control students" (ADAPT 1976). ADAPT students showed more logical, systematic, and deductive thinking after their freshman year than did students in either of the two control groups. The program was determined to be moderately successful in achieving its aims.

The Inquiry Training program at OISE was evaluated through the use of three criterion tests. A comparison of experimental and control students showed that experimental students scored higher than controls on the class inclusion problem, the physical science experiment and the social science experiment. Robinson, Tickle and Brison (1972) suggest that while the results look impressive, they are skeptical whether the cognitive skill instruction had any significant impact on the students' real lives.

In an evaluation of "Philosophy for Children", Haas (1976 b) found that fifth graders in the experimental program in Newark scored significantly higher than their controls on measures of curiosity and experimental attitude. In the same study, sixth grade experimental students in Newark scored significantly higher than controls on reading, listening and analytical questioning. Neither fifth nor sixth grade students in P4C showed significant improvement in logical thinking as measured by the California Test of Mental Maturity (CTMM). In a more recent evaluation of P4C, Higa (1980) found that the program conducted in Hawaii resulted in improvement in ideational productivity, and improvement in reasoning as measured by the Questioning Task III, a criterion-referenced test of reasoning ability, but no improvement in reasoning as measured by the CTMM

and no improvement in reading comprehension. Although there are discrepancies in the two evaluation studies, both suggest that P4C can facilitate some aspects of cognitive skill development. Which skills are improved may be at least in part a function of the idiosyncrasies surrounding particular cases of program implementation.

Cognitive Skill Instruction at Rockland Community College*

Rockland Community College (RCC) has a fifteen year old developmental/remedial education program, College Skills. College Skills provides a developmental sequence of four modularized programs of instruction. In addition to the traditional remedial courses in basic skill development, (e.g. reading, writing and math) College Skills students take one "clinical module" per semester. Like other courses in the program, the clinical modules form a developmental sequence. From lowest to highest level, these courses are: Oral Language Development, Effective Listening, Logic and Reasoning, and Introduction to Literature. The first three courses in the sequence are process-based courses designed to improve students' cognitive skills. Through the discussion and analysis of literature, the final course in the sequence provides an opportunity for students to apply the cognitive skills developed to the type of course content they will encounter in the college mainstream.

RCC's courses for improving cognitive skills are based on two assumptions. First, it is assumed that students in the program are transitional between concrete and formal operations. Two sources of evidence provide the basis of this assumption. Several investigators have demonstrated that although it was previously assumed that college students were functioning on the level of formal operations, many if not most students function on the concrete operational level. However, although students usually function on the level of concrete operations, I have frequently observed that these students can perform some types of formal

* David Nadvorney and Robin Mills have made substantial contributions to this project.

operational thinking when it is demanded by the situation. Many of the instructional procedures and materials in the Effective Listening and Logic and Reasoning courses require formal operational thinking. It is assumed that these materials are suitable for our students because of research evidence suggesting that educational materials and processes which are a half stage above the students' normal mode of functioning are most preferred by students and most appropriate for cognitive development.

Effective Listening and Logic and Reasoning courses meet twice a week for approximately an hour and a half per session. Classes are taught by professional instructors in the College Skills program. In-class paraprofessionals are available to assist the instructors. Instructors attend weekly training sessions to discuss the curriculum and to learn how to conduct the instructional activities.

Effective Listening

RCC's developmental listening course has been in existence for three semesters now; however, it is still in an experimental stage. Although the title might suggest the implementation of a discrete skills approach, the intent is to approach skill development holistically as much as possible. Consequently, a number of the instructional activities are directed towards simultaneously developing speaking, writing and listening skills. Effective Listening is a difficult course for both students and instructors. Students are often unaware of the need to improve their listening skills. Unlike with reading, which is a more concrete activity, it is difficult for students to perceive immediate problems or benefits of listening. Students know that they have been listening all their lives and they tend to assume that their listening failures are purely dependent upon motivational factors; they are not conceived as being dependent upon the need for cognitive skill acquisition or development. Another problem is that students characteristically exhibit relatively short attention span de-

ployment. Students have trouble maintaining attention, frequently because of distractions and boredom. In the listening class the instructor is therefore likely to be confronted with students who are not intrinsically motivated to improve their listening skills and with students who are easily bored by and distracted from the abstract activity of listening. Cogency, consistency and creativity are requisite skills for the listening instructor. While the challange is great, so can be the rewards. Nichols (1957) reports that a student can improve his or her listening up to 25% in a single semester.

Affective variables are important determinants of cognitive skill acquisition and development. The belief that one can improve one's listening facilitates the achievement of that goal. Reciprocally, the feeling that one cannot improve one's listening inhibits that form of intellectual achievement. As a function of the relationship between cognition and affect, the instructor should make a concerted effort to enhance the student's self concept and achievement motivation while teaching listening. External validation of one's performance or performance potential can exert a powerful influence on one's feelings of competence and on one's subsequent performance. Consequently the instructor should provide recognition and praise upon the student's successful completion of an exercise. This kind of human warmth and reinforcement is not just important and effective with children; adults also respond to people believing in and caring for them. Developmental or remedial students are especially receptive to warm, positive human feedback, perhaps because they have had so little of that response in previous academic situations.

Many listening courses in academia and industry employ a programmed instruction approach in which students work alone, wearing headsets, listening to cassette tapes and writing answers in workbooks. The present program does not adopt this approach because the author considers it to be highly artificial and unlikely to facilitate transfer. RCC's listening course is intended to be

as realistic as possible. Class activities usually simulate the teacher/learner paradigms the student is most likely to encounter in the college mainstream. The course objectives for Effective Listening are as follows:

1. To understand what is meant by listening and how the listening process operates.
2. To understand how listening is related to reading and other forms of communication.
3. To understand how listening plays a vital role in our every day lives.
4. To identify factors which interfere with effective listening.
5. To identify effective and ineffective listening strategies.
6. To become aware of one's own strengths and weaknesses in listening.
7. To recognize the need for improving one's listening skills.
8. To think about how one can overcome influences which impede the listening process.
9. To take notes effectively while listening.
10. To improve listening skills.
    - A. to develop the ability to concentrate
    - B. to develop an interest in material that is not spontaneously interesting
    - C. to identify the main idea, supporting ideas and significant details
    - D. to understand the relationship between ideas to which one is listening
    - E. to think actively about the information to which one is listening

Many instructional activities in the listening course are based on Case's (1978) developmental theory of instruction. Case argues that cognition often fails because the strategies employed are incomplete and ineffective. He emphasizes the need to analyze ineffective as well as effective cognitive skills in order to understand how and why processing breaks down or becomes distorted. Consistent with this approach, students in Effective Listening are taught and encouraged to examine their wrong answers as well as their right ones, and to understand why the strategy they used was ineffective. Table 2 contains a list of effective and ineffective listening strategies discussed in the course.

The Sequential Tests of Educational Progress (STEP) Listening Tests are useful not only for evaluation, but also for instruction. Level two of this test is used for pre-post evaluation of the listening course while other levels are used for instructional activities. Students are read a passage and then

must answer multiple-choice questions based on the information contained in the passage. These materials are most amenable to error analyses and identification of effective and ineffective listening strategies. It is not recommended, however, to center instruction solely around multiple choice formats. It is preferable to emphasize recall memory rather than recognition memory because the former requires a deeper level of information processing.

Not surprisingly, research I have conducted on students in the listening course indicates that students are relatively adept at listening for facts, but have trouble drawing inferences from the material they listen to. Part of the listening course utilizes the Barnell Loft (Boning, 1976) reading material, "Drawing Conclusions", adapting it for the listening course. Unlike the Barnell Loft procedure, based on the information they listened to, students are required not only to draw the right conclusion, but also to provide evidence for the particular conclusion they have reached. This procedure also helps ensure that students practice using deeper levels of processing.

As previously indicated, boredom frequently interferes with the listening process. In an effort to directly confront this perpetual and stubborn problem, a set of exercises was devised to help students overcome boredom. Students practice using a number of "interest probes", which essentially are questions designed to make the material more meaningful to the listener. For example, one probe involves the student listening to material from the point of view of someone he or she knows personally who would be interested in the information being conveyed. Thus a student assigned to listen to the McNeil-Lehrer report 's discussion of the new government in Zimbabwe adopts the point of view of his sister because she is interested in international politics, while he is not. Presumably his sister would not tune out because of boredom so neither will he. Listening from another person's point of view is a complex cognitive task, however if executed, it can be an effective and even enlightening listening strategy.

Although RCC's listening course currently has a predominantly process-based curriculum, efforts are now underway to integrate substantive content into the teaching of listening. We are developing a series of lectures and exercises on psychology and political science which will be used in the listening course. Integrating process and content should make the listening course more interesting, it should facilitate the transfer of listening skills, and it should allow students to see how improving listening skills can make mainstream courses more meaningful.

Logic and Reasoning

RCC's Logic and Reasoning course is designed to sensitize students to their thinking processes and to improve their thinking skills. Like Effective Listening, this is a process-based course which attempts to develop cognitive skills holistically. The objectives to be attained through the current curriculum are as follows:

1. To increase awareness of one's own thinking processes.
2. To recognize the existence of variations in thinking styles and strategies.
3. To identify ineffective and effective thinking strategies.
4. To transform information from ineffective to effective reasoning.
5. To increase the flexibility of one's thinking.
6. To increase clarity and precision in the conception and expression of ideas.
7. To increase the meaningfulness of communication.
8. To argue more logically and cogently.
9. To convert implicit understanding to explicit explanation.

The major cognitive skills to be developed through this course include critical thinking, clarification, logical reasoning, and argumentation. Case's (1978) theory with its emphasis on learning through error analysis, provides a basic principle of and technique for guiding instruction. The first part of the course is devoted to detecting and correcting errors in reasoning. Logical absurdities from Maw and Maw's,"Foolish Sayings Test" (1972) provide the material for my three phase instructional procedure.

Sample item: The captain said, 'Don't shoot until you see the whites of their eyes". (Maw & Maw).

Procedure: Phase 1: Students are given 20 such items and are asked to indicate whether each item is an example of good reasoning or poor reasoning. After students have classified each item, papers are collected.

Phase 2: Another copy of the same items is passed out to the class. Students again are asked to rate the quality of reasoning of each item. This time, however, students are also required to explain why each item is an example of good or poor reasoning.

Phase 3: After papers have been graded and returned to the students, the class members alternate reading and discussing test items.

Students tend to be relatively impulsive during the first phase and more reflective during the second phase. They occasionally change not only their quality ratings of the items, but their entire interpretation of the meaning of these items. The first two phases sensitize students to their own thinking processes. The third phase sensitizes them to the thinking styles and strategies of others. In this exercise the emphasis is on being sound and logical, having reasonable explanations to support whichever quality rating is arrived at. It is irrelevant whether the student gives the answer the instructor had in mind. Many items can be used to illustrate either good or poor reasoning. In the case of the present example, either of the following types of explanations would be acceptable.

Good reasoning: because being close enough to a person so you could see the whites of his/her eyes will allow you to determine the identity of the person so you can make sure you shoot your enemy instead of your comrade.

Poor reasoning: because if you wait to see the whites of their eyes you'll be shot before you get the opportunity to shoot.

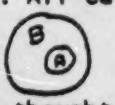
Exercises which focus on the detection and correction of errors in reasoning can lead to the development of critical thinking skills. In addition to the section on logical absurdities, critical thinking is enhanced in the course through the analysis of common forms of deception and propaganda. Evaluation of critical thinking skills through in-house tests indicates that Logic and Reasoning is effective in developing students' ability to think critically.

The section of the course on clarification of thought focuses on recognizing the existence of problems of meaning and strategies which can be employed to resolve problematic meanings. Such problems of meaning are: ambiguity, vagueness and incoherence. Consider, for example, the following story. (Hartman-Haas 1979)

> Mr. Wilson was furious. His wife recently told him that their daughter, Mary, was pregnant and about to have an abortion. For religious reasons he wanted to talk her out of it. He and Mrs. Wilson had been having such serious arguments about the problem that they were on the verge of separating. With his daughter pregnant and his wife miserable, one evening after making his decision he called her into the den and said:
>
> What are three things Mr. Wilson could have said?

Many students do not recognize that "her" in the last sentence of the story is referentially ambiguous and could refer either to Mr. Wilson's wife or daughter. For these students clarification is not an issue because a problem of meaning is not perceived to exist. Students who do detect the ambiguity can clarify it either by engaging in internal clarification or by external clarification (Hartman-Haas 1979). Internal clarification involves solving the problem of meaning by using one's own knowledge and reasoning in conjunction with information contained in the context of the material to be understood. For example, the student might decide that "her" is more likely to refer to the daughter, because the pregnancy and the problems associated with it constitute the main theme of the story. Alternatively, the student might decide to clarify the ambiguity by seeking clarifying information from an external source, such as a teacher or a friend.

This strategy is entitled external clarification. Students in the course practice using clarification strategies and discuss situations in which various strategies would be differentially effective.

Logical thinking skills are developed in RCC's course through a series of exercises from formal logic. Students are taught the four types of logical sentences and learn to translate sentences in conventional English to the form of the standardized logical sentence. Students learn to represent the same logical sentence in three distinct ways: verbally, e.g. All cats are mammals.; symbolically, e.g. All A are B.; and graphically, e.g. 

This section of the course contains exercises on the reversibility of thought. Through having students reverse the subject and predicate of logical "all" and "no" sentences, the instructor encourages students to discover the rules governing sentence reversals. People tend to be rather sloppy in their thinking. They use different ideas interchangeably, and twist concepts and relationships. Learning the rules and principles of logic is intended to help students make their thinking more precise. Reversibility exercises are intended to show students when concepts can be reversed and retain their meaning and when they cannot be reversed without drastically altering the original meaning. Piaget acknowledges reversibility to be one of the major dimensions of logical thinking.

Resistance to Cognitive Skill Instruction

One problem which has emerged repeatedly in the three semesters of improving cognitive skills at RCC is the initial resistance of students towards courses in Effective Listening and Logic and Reasoning. Students enrolled in developmental programs frequently lack confidence in their academic skills and accept that they need instruction in reading and writing. These are traditionally considered to be requisite skills for succeeding in life in a literate society. In fact, literacy is defined as the ability to read and write. Our culture values

these skills and provides them a legitimacy, indeed deems them to be a necessity in our educational experience. Reading and writing are skills which must be taught. Instruction in reading and writing, whether formal or informal, constitutes part of the educational experience of all literate people. Specific instruction in reading and writing therefore is not only accepted, but expected. The instructor does not have to convince students that they can benefit from instruction in reading and writing. Most students do not believe that they can develop these skills entirely on their own. They recognize that they can improve their reading and writing skills through instruction. Not only do developmental students perceive improvement in reading and writing as possible, but they also consider it desirable.

Such is not the case with listening and thinking. These academic and life skills do not form distinct parts of traditional educational curricula. Although schools characteristically do not provide explicit instruction in listening and thinking, these skills provide the bases for virtually all educational processes and outcomes. Additionally, most educational theories and practices implicitly or explicitly assume that an educated person should be effective in reasoning and adept at processing auditorily presented information. Why then does our educational system devote such scant attention to the development of these skills? Do educators believe that unlike reading and writing, effective reasoning and listening occur spontaneously during the course of development and therefore do not require special instruction? Perhaps at least partially because listening and thinking are not formally sanctioned by our educational system, students may initially resist college level courses designed to facilitate the development of these skills. Lack of official status of these skills as legitimate educational outcomes may impel students to perceive instruction in reasoning and listening to be neither possible nor desirable.

Another source of resistance to reasoning and listening instruction, from instructors as well as students, may be inherent in the abstract nature of these skills. The benefits of improvement in reasoning and listening are more intangible than the rewards of reading and writing. From the point of view of the students, it is relatively easier to experience evidence of the effectiveness of reading and writing instruction than of reasoning and listening instruction. The product of the former is concrete and tangible; the product of the latter is abstract and intangible.

Finally, affective characteristics of developmental students may contribute to the initial resistance to thinking and listening courses. Students in developmental/remedial courses frequently have had a history of failure and frustration in school. Because of these experiences they tend to be insecure and doubtful of their intellectual competence and performance. Often they are ashamed that they require remedial work in reading and writing. While they reluctantly accept the need for instruction in reading and writing, confronting them with the new and additional requirement that they improve their listening and thinking skills may constitute another affront to their concept of themselves as academic achievers. Despite the initial resistances, whatever the reasons, by mid-semester students can usually see the benefit of cognitive skill instruction.

Prospects

CALL FOR RESEARCH

research on:
1. What is the role of feedback in facilitating the development of listening?
2. To what extent is listening impairment a motivational rather than a cognitive problem?
3. To what extent does memory inhibit effective thinking and listening?
4. What are the special problems of listening and reasoning for non-native speakers of English?

CALL FOR HOLISM

holistic approach to:

1. cognitive skill development = thinking + listening + remembering + reading + writing + speaking
2. person = cognition + affect
3. education = content + process; Thinking Across the Curriculum
4. curriculum = sciences + humanities + arts + technologies; Multidisciplinary

CALL FOR TEACHER TRAINING

training as:

dissemination - faculty reeducation for cognitive skill instruction

dialogue - forum for discovering, discussing and experimenting with issues related to teaching for cognitive development

feedback - method of obtaining formative evaluation information for curriculum revision

fruit - resource for new ideas: materials, topics, instructional techniques.

Informal Survey of Cognitive Skill Instruction Programs

Programs and Developers	Program Descriptions
Concordia College David Jacobson	Problem solving: identify, describe problem, gather, evaluate information, formulate, test hypotheses; analytic, synthetic, critical thinking; interdisciplinary
Essex County College Dave Griffiths Geoffrey Deans Miles MacMahon	Multidisciplinary; Piagetian; information gathering, processing, responsive behaviors, evaluative activities, restructuring activities, application to new situations
Institute for Political/Legal Educ.	Political attitudes; productive thinking; decision making; grades 5 - 9
Montclair State College (P4C) Matthew Lipman Ann Sharp	Logical reasoning; creativity; listening; reading; questioning; experimental attitude; content and process of philosophy
Orange County Community College Edwin de Bennett	Analytical thinking and sociology; systems approach to sociological analysis
Pace University Virginia Black	Formal logic, clear thinking, informal fallacies, critical thinking, 5th grade
Piedmont Technical College Curtis Miles	Discrete reasoning skills; define, specify problem, gather, classify, use evidence
Rockland Community College Hope J. Hartman-Haas	Critical thinking, logical reasoning, listening, clarification strategies, argumentation
Rutgers University Howard Gruber Hope J. Haas	Abstract, critical, creative, and logical thinking memory, problem solving, motivation and planning, emotion and thought
U.C.L.A. Moshe Rubenstein	Problem solving, decision making, inquiry training, interdisciplinary-sciences
Univ. of Cincinnati Dan Wheeler Robert Hoffman	Problem solving, decision making, logic, listening and speaking, assumptions, meaning, reading, writing, analogy

Table 1 continued

Programs and Developers	Program Descriptions
Univ. of Massachusetts Jack Lochhead John Clement Frederick Byron Jr.	Correcting misconceptions in content areas; physics, mathematics; representational transformations
Univ. of Nebraska (ADAPT) Robert Fuller	Multidisciplinary; Piagetian; analytical, critical, and logical thinking
Univ. of Toronto Peter Reich Carol Reich	Problem solving; inductive, deductive reasoning; game theory; computer models
Ontario Institute for Studies in Educ. Floyd G. Robinson (Inquiry John Tickle Training) David Brison	Multidisciplinary; Piagetian; problem solving, correlational thinking, logic, classification, seriation, probability, information exploration and acquisition
Wisconsin University Lawrence A. Dallenbach	Analytical thinking and economics; computer assisted instruction

Table 2

Ineffective Listening Strategies	Effective Listening Strategies
Literal interpretations	Implications, symbolic interpretations
Focus on words, sentences in isolation	Focus on relationships between ideas
Unselective	Selective
Not synthesize, draw conclusions	Synthesize, draw conclurions
Not relate information to general world knowledge and experience	Relate information to general world knowledge and experience
Subjective evaluation of information	Objective evaluation of information
Passive reception of information	Active processing of information
Not identify supporting information	Identify supporting information
Not aware of comprehension failures	Recognize lack of understanding
Not clarify when recognize lack of understanding	Clarify when recognize comprehension failure
Poor concentration; easily distracted	Good concentration; shut out distractions
Not attempt to store information	Attempt to store information

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